

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

APHIS-PPQ

Prepared by K. Whittle* and D. C. Ferguson†

APHIS 81-50
September 1987
Pest

PUMPKIN CATERPILLAR
Diaphania indica (Saunders)

Selected
Synonyms

Eudiotpes indica (Saund.)
Margaronia indica (Saund.)
Glyphodes indica Saund.
Phacellura indica (Saund.)

Order: Family

Lepidoptera: Pyralidae

Economic
Importance

D. indica was considered one of the more important pests of cucurbits in the Indian Region (U.S. Department of Agriculture 1958). In severe outbreaks in Queensland, Australia, most of the foliage was destroyed; larvae then burrowed into the stems. Larvae attacked the newly set fruit, bored into the ovaries, and destroyed them. In the Qatif area of Arabia, larvae damaged about 15 percent of the watermelons (Talhouk 1969). In Yemen (Aden), a severe outbreak damaged late-sown melons in 1977. There, larvae ranged 5-60 per sweet melon fruit in 20 ha (Ba-Angood 1978).

Hosts

Cultivated cucurbits are the preferred hosts (U.S. Department of Agriculture 1958). The life cycle was successfully completed on hosts marked with an asterisk (Pandey 1976). The pest feeds on Alcea rosea (hollyhock), Beta vulgaris (beet) (U.S. Department of Agriculture 1958), Citrullus lanatus (watermelon)*, Coccinia grandis (tondi) (Patel and Kulkarny 1956), Cucumis melo (melon)*, Cucumis sativus (cucumber)*, Cucurbita moschata*, Cucurbita pepo (pumpkin)*, Ficus racemosa, Glycine max (soybean), Gossypium hirsutum (cotton) (Patel and Kulkarny 1956), Hibiscus sp., Jasminum sambac (Arabian jasmine) (U.S. Department of Agriculture 1958), Lagenaria cylindrica*, Lagenaria siceraria (bottlegourd)*, Luffa acutangula*, Luffa aegyptiaca*, Momordica charantia*, Praecitrullus fistulosus*, Solanum melongena (eggplant) (Patel and Kulkarny 1956), Trichosanthes anguina (snakegourd)*, and T. dioica (parval)

* Technical Information Systems Staff, PPQ, APHIS, USDA,
Federal Building Room 611, Hyattsville, MD 20782

† Systematic Entomology Laboratory, Biosystematics and
Beneficial Insects Institute, Agricultural Research Service,
c/o U.S. National Museum of Natural History, Washington, DC
20560

(Patel and Kulkarny 1956). Pandey (1976) found that Cucumis melo was the most suitable food plant for completing the life cycle and Trichosanthes anguina, the least suitable.

General Distribution

This species has been recorded from AFRICA: Benin, Central African Republic, Chad, Congo, Gabon, Guinea, Ivory Coast (Patel and Kulkarny 1956), Maldives (U.S. Department of Agriculture 1958), Mali, Mauritania, Mauritius, Niger, Senegal (Patel and Kulkarny 1956), and Seychelles (U.S. Department of Agriculture 1958); ASIA: Burma, Cambodia (Patel and Kulkarny 1956), India (Pandey 1976), Indonesia, Japan, Laos, Malaysia--west (Patel and Kulkarny 1956), Philippines--Mindanao (U.S. Department of Agriculture 1958), Saudi Arabia--east (Talhouk 1969), Sri Lanka, Thailand, Vietnam (Patel and Kulkarny 1956), and Yemen (Aden) (Ba-Angood 1978); OCEANIA: Australia, Carolines, Christmas Island, Fiji (U.S. Department of Agriculture 1958), Gilbert Islands, Marianas (Esaki 1939), Marquesas (U.S. Department of Agriculture 1958), Marshall Islands, Palau (Esaki 1939), Samoa, Tahiti, Tonga (U.S. Department of Agriculture 1958), and Vanuatu (Cohic 1953).



Diaphania indica distribution map (Prepared by Technical Information Systems Staff, PPQ, APHIS, USDA).

This species has been recorded from the New World based on records published by Kimball (1965) and labeled specimens in the U.S. National Museum. The following sources are listed: Paraguay, French Guiana, Venezuela, Cuba, and Jamaica. Also, one specimen was collected in Puerto Rico in 1913. It has been present in Florida since 1946, but no economic damage has been recorded there for this pest (Kimball 1965; R. Stewart and D. Ferguson, pers. comm.).

Characters

ADULTS (Fig. 1) - Forewing glossy, translucent white with wide, sharply defined, dark brown (nearly black) border on costa and outer margin; hindwing similar but with dark border on outer margin only. Pro- and mesothorax, and most of head and its appendages similarly dark and appearing continuous with dark costal border of forewing. Metathorax and first 4 abdominal segments white; 5th and 6th abdominal segments dark brown to black dorsally, 7th abdominal segment usually white but may be dark in some specimens. Anal tufting of mixed yellow and brown spatulate scales, often expanded and conspicuous in males, much less so in females. Wing undersides marked as above but with dark borders less intense; legs and underside of body mostly white. Forewing length 9.0-12.0 mm, average 10.5 mm (N = 20).

Identification of adults of Diaphania indica is sometimes a problem because it belongs to a tropical American group of about 18 described and probably many undescribed species of similar appearance. However, one feature seems to be unique and therefore diagnostic--abdominal segments 5 and 6 are always dark dorsally. In D. hyalinata (L.) (melonworm), a common species of the Southern United States and northern neotropics with which D. indica is most likely to be confused, abdominal segments 1 to 5 are white, and segments 6 and 7 may be dark or light (Fig. 2). This dark abdominal coloring is often reduced or absent in D. hyalinata but not in D. indica. In other species of the group, the dorsum of the abdomen is generally all brown or all white. The special tufts of long scales at the end of the abdomen in D. indica are brown or yellow and no wider than twice the width of the abdomen; in D. hyalinata males, they are often nearly black and expanded to 3-4 times the width of the abdomen. The forewing dark outer border widens toward the anal angle in D. indica but rarely does so in D. hyalinata. D. indica is a smaller species, its wing length averaging 2 mm less than that of D. hyalinata.

The genitalia of D. indica and D. hyalinata indicate a close relationship but are readily distinguishable. The paired scale

(Figs. 1-2)



Diaphania adults, dorsal view, 4 X. 1. D. indica,
2. D. hyalinata.

tufts arising near the bases of the valves in the male genitalia of D. indica hardly exceed the valves in length or width, whereas those of D. hyalinata are about twice as large.

The female genitalia of the two species are similar in shape but easily distinguished because the entire bursa copulatrix of D. indica is densely covered with coarse spicules on its interior surface, these resembling elongated shark's teeth under relatively low magnification. The bursa copulatrix of D. hyalinata has a finely granulated interior surface, with a reduced area of minute spicules apparent only under higher magnification.

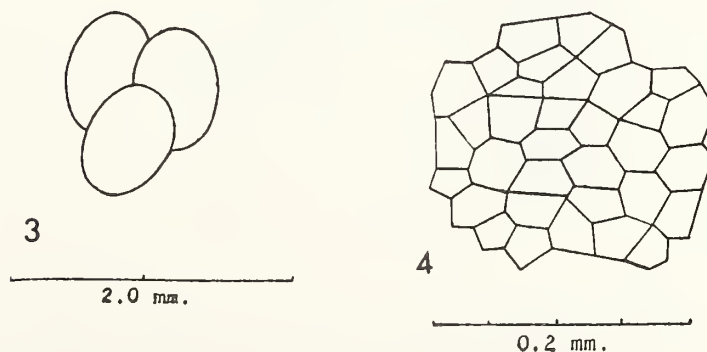
EGGS (Fig. 3) - Ovoid, slightly flattened, surface reticulate (Fig. 4); pale yellowish when laid, darkening before hatching; about 0.80 mm long.

LARVAE (Fig. 5) - Mature larva about 20.0 mm long, green or greenish yellow, prothoracic to last abdominal segment with pair of straight, parallel, subdorsal white stripes, meso- and metathorax with small black spots at bases of subdorsal setae. White subdorsal stripes may be indistinct in earlier instars, and faded in specimens preserved in alcohol.

Black thoracic spots and white stripes occur in other Diaphania species including D. hyalinata, and are therefore not diagnostic for D. indica. At present, no clear character differences are known that will distinguish eggs or larvae of D. indica from those of D. hyalinata or other closely related species of Diaphania.

PUPAE (Fig. 6) - About 12.0 mm long; brown; surface somewhat dull rather than shiny, finely pitted on abdomen. Structure

(Figs. 3-4)



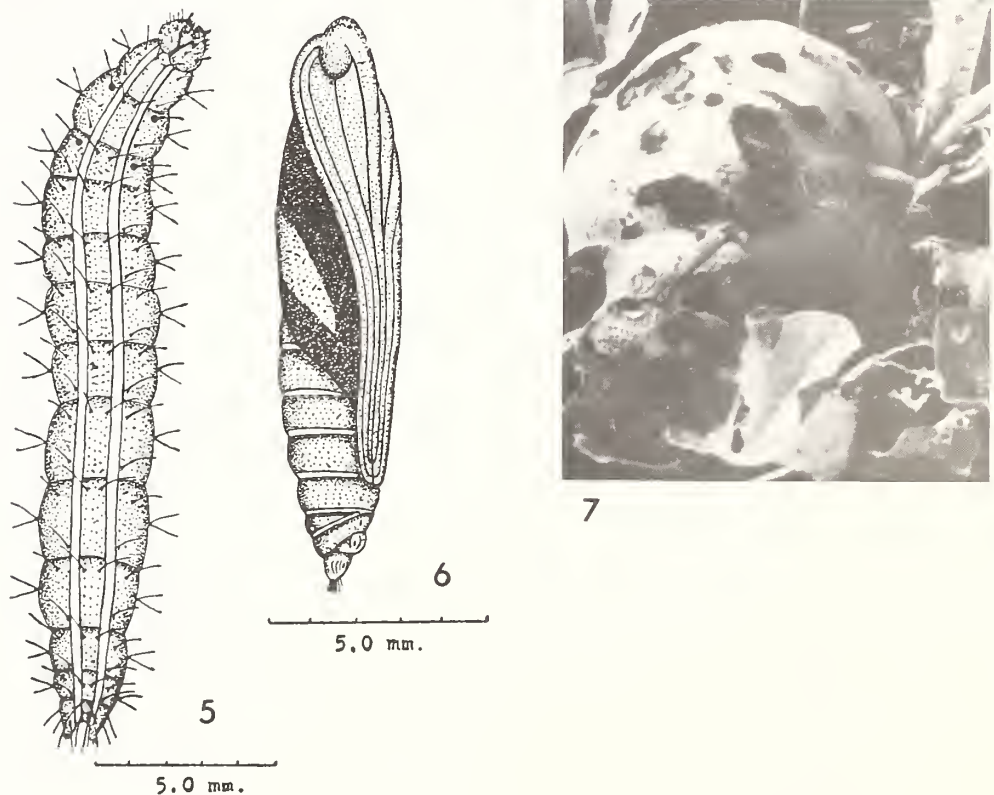
Diaphania indica. 3. Eggs. 4. Reticulation on the egg chorion.

typically pyraustine, but as in other members of the indica-hyalinata group and some other genera of Pyraustinae, the part of the pupal shell encasing the proboscis and antennae unusually elongated, almost reaching end of abdomen, and free from body beyond segment 5. This free process extends to abdominal segment 7 in D. indica, and to segment 8 or 9 in D. hyalinata.

Characteristic
Damage

Damaged leaves (Fig. 7) show various irregular injury patterns on the undersides. When damaged patches dry, the leaves become distorted. Host ovaries or developing fruit with soft rinds show larval tunnels. No fruits with a hardened rind are damaged (Patel and Kulkarny 1956). Sometimes, irregularly shaped holes are gouged into the fruit (Fig. 7), particularly at the stem end (May 1946).

(Figs. 5-7)



Diaphania indica. 5. Fifth instar larva, dorsal view. 6. Pupa, ventrolateral view. 7. Larval damage to melon leaves and fruit (5-6 from Patel and Kulkarny 1956, 7 from Ba-Angood 1978).

Detection
Notes

PPQ has intercepted larvae of pyralid moths identified as Diaphania indica over 20 times from Jamaica since 1979. However, this species is now recognized as more likely a complex of D. indica and D. hyalinata. Most of these interceptions were on the fruit of Momordica balsamina (balsam-apple). In the same period, PPQ has intercepted larvae identified as Diaphania spp. 152 times from various hosts and countries. The most common hosts were cucurbits, such as Luffa acutangula, Momordica charantia, and Sechium edule. Based on the hosts and geographic localities recorded on these interceptions, the species was probably D. indica or D. hyalinata. The majority of D. indica's hosts, cucurbits, are prohibited entry from Australia and much of Africa, Asia, and South America, under Title 7, Part 319.56 of the Code of Federal Regulations because of various fruit flies. Other hosts from these localities and the above hosts from most other localities are enterable with inspection.

The species may be detected in the following ways.

1. Inspect undersides of leaves for eggs, larvae, and frass.
2. Cut fruit to expose larval tunnels in pulp.
3. Examine stem end of fruit for larval feeding.
4. Inspect cocoons spun of tied leaves or leaf fragments for pupae.

For identification, submit pinned and labeled suspect adult specimens. Preserve larvae and pupae in alcohol. Larval identification may be tentative since larvae of D. indica may be easily confused with D. hyalinata, a common U.S. species.

Biology

In tropical regions, D. indica will probably breed throughout the year, but in Japan only three broods are produced annually. The species overwinters as a larva in Japan (U.S. Department of Agriculture 1958). Pupation occurs in light silken cocoons spun inside shelters of tied leaves or leaf fragments (May 1946). The pupal stage lasts 5-13 days at about 31 °C. At a mean of 27 °C, males and females live for 3-5 and 3-7 days, respectively (Patel and Kulkarny 1956).

In India, the female lays 22-366 eggs (average of 159), singly or in groups on undersides of leaves. Eggs hatch in 3-6 days at a constant 31 °C. Young larvae move about for some time, then feed on the underside of the leaves or fold a single leaf and continue feeding from inside the fold (Patel and Kulkarny 1956). Larvae may burrow inside the stem (May 1946). They also

feed on flower ovaries. Larvae bore into and feed inside fruit. In the laboratory, they feed little during the first 5 days but feed voraciously during the 3 days before pupation. They pass through four or five instars. Larval periods ranged 9-14 days at a constant 31 °C (Patel and Kulkarny 1956).

Literature
Cited

Ba-Angood, S. A. S. Outbreak of the melon worm, Diaphania indica Saund. Food and Agric. Organ. Plant Prot. Bull. 26(1): 31-32; 1978.

Cohic, F. Enquete phytosanitaire sur les plantations des Nouvelles-Hebrides. Rev. Agric. Nouv. Caledonie (N.S.) 4(1-6):11-21; 1953. Taken from: Rev. Appl. Entomol. Ser. A, 43(12):412-413; 1955.

Esaki, T. A preliminary report on the entomological survey of the Micronesian Islands under the Japanese Mandate, with special reference to the insects of economic importance. Proc. 6th Pac. Sci. Congr. 4:407-415; 1939. Taken from: Rev. Appl. Entomol. Ser. A, 31(7):292-293; 1943.

Kimball, C. P. The Lepidoptera of Florida. An annotated checklist. Arthropods of Florida and neighboring land areas. Vol. 1. Gainesville, Florida: Division of Plant Industry, State of Florida Department of Agriculture 1965: 209, plate XXV.

May, A. W. S. Pests of cucurbit crops. Queensland Agric. J. 62(3):137-150; 1946.

Pandey, P. N. Development and growth of Diaphania indica Saunders in relation to cucurbits. Mem. Soc. Cienc. Nat. La Salle 36(104):209-215; 1976.

Patel, R. C.; Kulkarny, H. L. Bionomics of the pumpkin caterpillar--Margarona indica Saund. (Pyrilidae: Lepidoptera). Bombay Nat. Hist. Soc. J. 54(1):118-127; 1956. Taken from: Rev. Appl. Entomol. Ser. A, 46(4):136-137; 1958.

Talhok, A. M. S. Insects and mites injurious to crops in middle eastern countries. Monogr. Angew. Entomol., Beih. Z. Angew. Entomol. 21:8; 1969.

United States Department of Agriculture, Agricultural Research Service, Plant Pest Control Division. Pumpkin caterpillar (Diaphania indica (Saunders)). Insects not known to occur in the United States. U.S. Department of Agriculture, Coop. Econ. Insect Rep. 8(39):841-842; 1958.